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## Supplementary Material

### **A native parasitic plant affects the performance of an introduced host regardless of environmental variation across field sites**

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## Crafers









Bradbury



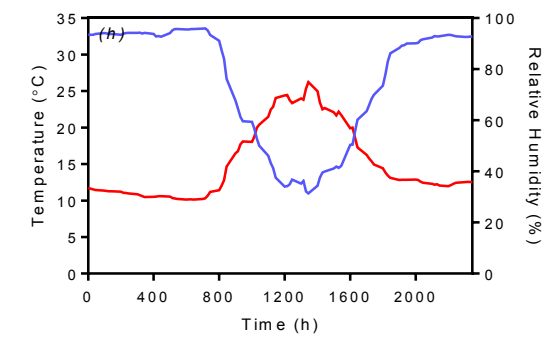
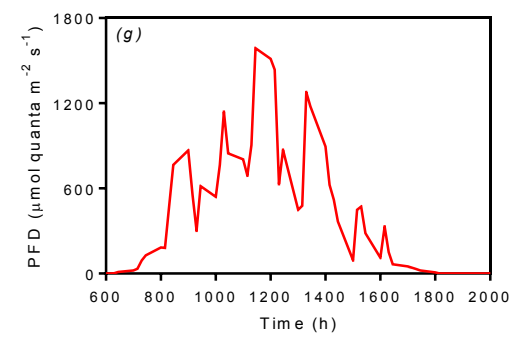
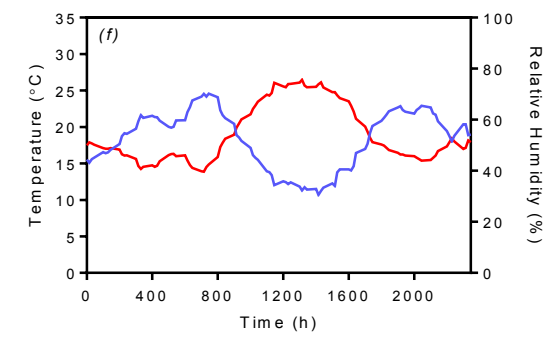
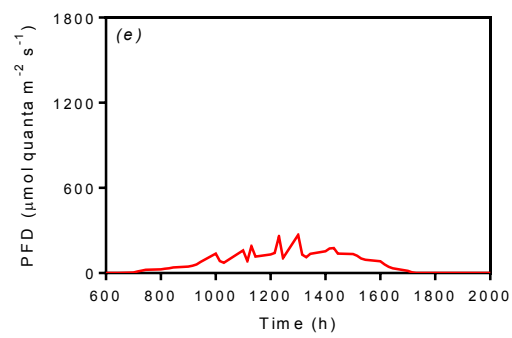
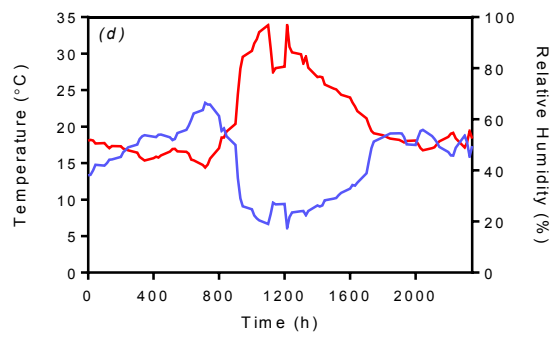
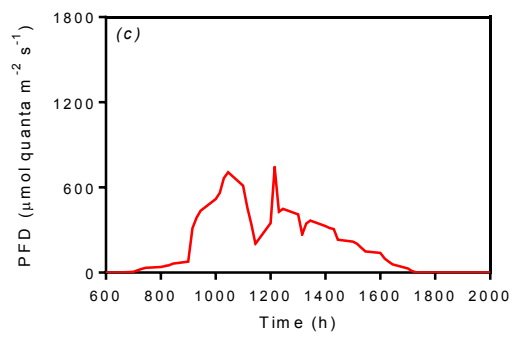
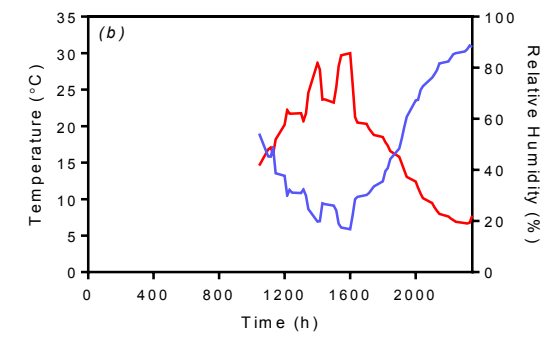
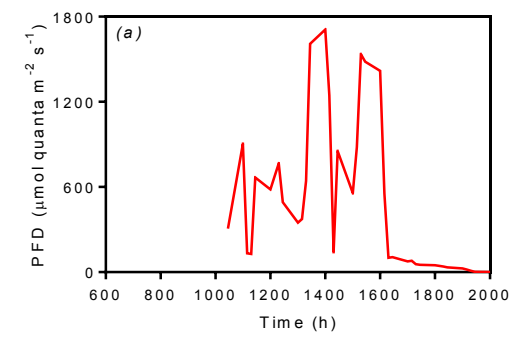


Engelbrook





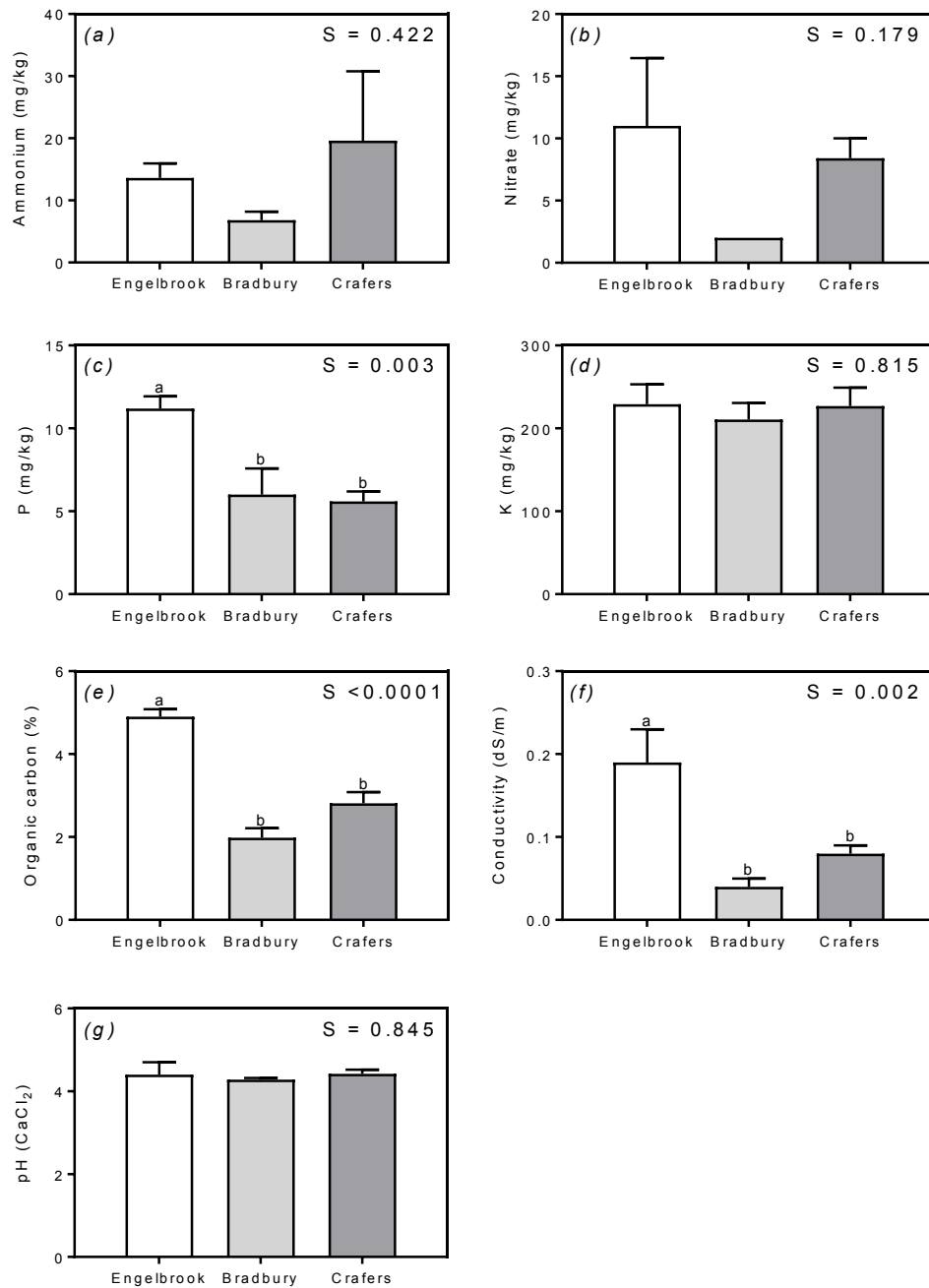
**Fig. S1.** Photos of experimental plants (tagged with flagging tape) at the three field sites (Crafers, Bradbury and Engelbrook), located in the Mt. Lofty Ranges of South Australia. White and yellow arrows denote uninfected and *Cassytha pubescens* infected *Ulex europaeus*, respectively. The purple arrow denotes a dead *Ulex europaeus* sheathed in the parasite at Crafers.





**Fig. S2.** Typical diurnal traces for photon flux density (PFD, *a, c, e & g*), and temperature (red) and relative humidity (blue) (*b, d, f & h*), during the study at the three field sites (*a, b*) Engelbrook, (*c, d & e, f*) Bradbury and (*g, h*) Crafers in the Mt. Lofty Ranges of South Australia (in mid-March, early May and early April, respectively, 2013). Note: there are two light/RH/temp graphs for Bradbury because at this location experimental plants were found both at the top (*c, d*) and at the bottom of a slope (*e, f*).





**Fig. S3.** (a) Ammonium, (b) nitrate, (c) phosphorous (P), (d) potassium (K), (e) organic carbon, (f) conductivity and (g) pH of soil (top 60 cm of profile) from each field site (Engelbrook, Bradbury and Crafers) where measurements on *U. europaeus* and *C. pubescens* were made. Data are means ( $\pm$  s.e.),  $n = 5$ ,  $P$ -value (one-way ANOVA) for the effect of site (S) on each parameter is included in figure panels and different letters denote significant differences ( $P < 0.05$ ). CSBP methods used for soil analysis: Ammonium and nitrate extracted with 2M potassium chloride and measured colourimetrically. P & K (Colwell)



(1:100 soil/0.5M sodium bicarbonate extract shaken for 16 h and phosphorous and potassium concentration determined by colourimetry and flame atomic absorption, respectively).

Organic carbon (Walkley-Black), conductivity (1:5 soil/water suspension) and pH ( $\text{CaCl}_2$ ) (1:5 soil/0.01M calcium chloride suspension).



**Table S1. Results of two-way ANOVA for the effect of infection with *Cassytha pubescens* (I) and site (S) on pre-dawn and midday PSII efficiency ( $F_v/F_m$ ,  $\Phi_{PSII}$ ), maximum electron transport rates ( $ETR_{max}$ ), pre-dawn (PD) and midday (MD) water potentials ( $\Psi$ ), carbon isotope composition ( $\delta^{13}C$ ), nitrogen (N), aluminium (Al), iron (Fe), potassium (K) and sodium (Na) concentration of *Ulex europaeus* spines**

Degrees of freedom = (*df*) numerator (num.)/denominator (denom.) and *F* and sum of squares values are italic and regular type, respectively

| Factor<br>( <i>df</i> num.) | $F_v/F_m$   | $\Phi_{PSII}$ | $ETR_{max}$  | PD $\Psi$    | MD $\Psi$    | $\delta^{13}C$ | N            | Al          | Fe          | K           | Na          |
|-----------------------------|-------------|---------------|--------------|--------------|--------------|----------------|--------------|-------------|-------------|-------------|-------------|
| I (1)                       | <i>16.5</i> | <i>15.2</i>   | <i>16.6</i>  | <i>0.800</i> | <i>0.120</i> | <i>12.5</i>    | <i>12.3</i>  | <i>49.5</i> | <i>30.3</i> | <i>7.83</i> | <i>1.33</i> |
|                             | 0.017       | 0.152         | 45215        | 3.99         | 0.024        | 9.20           | 0.622        | 20695       | 27732       | 34945281    | 505024      |
| S (2)                       | <i>13.1</i> | <i>2.36</i>   | <i>0.413</i> | <i>1.86</i>  | <i>8.86</i>  | <i>10.5</i>    | <i>26.5</i>  | <i>8.03</i> | <i>1.52</i> | <i>11.7</i> | <i>4.05</i> |
|                             | 0.027       | 0.047         | 2246         | 18.5         | 3.58         | 15.5           | 2.69         | 6712        | 2787        | 104171750   | 3084881     |
| I $\times$ S (2)            | <i>7.70</i> | <i>0.065</i>  | <i>1.15</i>  | <i>3.47</i>  | <i>6.15</i>  | <i>11.4</i>    | <i>0.152</i> | <i>1.12</i> | <i>1.03</i> | <i>1.15</i> | <i>2.41</i> |
|                             | 0.016       | 0.001         | 6229         | 34.5         | 2.48         | 16.7           | 0.015        | 937         | 1877        | 10255598    | 1837014     |
| Error                       | 0.046       | 0.440         | 119713       | 219          | 8.89         | 30.2           | 2.08         | 17140       | 37528       | 183070143   | 15630936    |
| <i>Df</i> (denom.)          | 44          | 44            | 44           | 44           | 44           | 41             | 41           | 41          | 41          | 41          | 41          |

**Table S2. One-way ANOVA results for the effect of site (S) on pre-dawn and midday PSII efficiency ( $F_v/F_m$ ,  $\Phi_{PSII}$ ), maximum electron transport rates ( $ETR_{max}$ ), carbon isotope composition ( $\delta^{13}C$ ), nitrogen (N), potassium (K) and sodium (Na) concentration of *Cassytha pubescens* stems when infecting *Ulex europaeus***

Degrees of freedom = 2, 22 for all parameters and  $F$  and sum of squares values are in italic and regular type respectively

| Factor | $F_v/F_m$   | $\Phi_{PSII}$ | $ETR_{max}$ | $\delta^{13}C$ | N           | K           | Na          |
|--------|-------------|---------------|-------------|----------------|-------------|-------------|-------------|
| S      | <i>3.11</i> | <i>0.122</i>  | <i>6.14</i> | <i>4.48</i>    | <i>2.33</i> | <i>3.68</i> | <i>13.0</i> |
|        | 0.013       | 0.001         | 11823       | 6.61           | 0.147       | 36704600    | 26202896    |
| Error  | 0.046       | 0.049         | 21181       | 16.3           | 0.693       | 109809000   | 22193280    |